REMARKS

Claims 1-9 are pending in the application. Claims 1-4 and 9 are rejected. Claims 5-8 are withdrawn from consideration on the basis of an election of species. Applicants have amended claim 1 and cancelled claim 3.

Specification

The Examiner has provided the outline of an application as provided in 37 C.F.R. § 1.77(b) at pages 2-5 of the Office Action. Applicants note, however, that no specific objection has been raised with respect to the specification. Thus, no amendments have been made that relate to the cited section of the Rules.

The Examiner also states at paragraph 8 of the Office Action that the specification has not been checked to the extent necessary to determine the presence of all possible minor errors. However, the Examiner then states a requirement for a substitute specification in paragraph 9 "because it appear to be a direct translation and is difficult to comprehend."

Applicants respectfully traverse this requirement. A review of the entire document as well as by using the "grammar and spell check" tool in Word reveals only two instances of misspelling and no instance of improper grammar. The misspellings are corrected.

If the Examiner persists in maintaining this objection, Applicants respectfully request that the specific instances of indefiniteness should be identified.

Title

The Examiner objects to the original Title and suggests a substitute Title, namely, "Eddy Current Detection of Wheel Speed with Voltage Threshold Shifting." This substitute Title seems appropriate and has been adopted.

Abstract

The Examiner objects to the original Abstract, presumably because it exceeds the maximum word count, as evidenced by twenty lines of text. Applicants have prepared and substituted a shortened Abstract meeting the 150 word limit.

Claim Rejections – 35 U.S.C. § 101

Claims 1-4 appear to be rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. This rejection is traversed for at least the following reasons.

The Examiner states that the invention as claimed does not require any physical transformation and does not produce a useful, concrete and tangible result. This rejection is a recently popular rejection by patent Examiners, apparently based on an earlier policy of the USPTO, but now superseded by new USPTO view of requirements under the *State Street Bank* case as of April 2007.

The Examiner asserts that the invention merely calculates speed, an abstract concept. The Examiner suggests that the applicant add "providing an output to" phrase in the claims to provide the real world result.

Applicants traverse this rejection without the suggested amendment since the claim relates solely to a device having real structure. The claim is not to an abstract idea or law of nature, the only recognized exceptions to the categories of protectable subject matter under U.S. Supreme Court precedent. The Court in *Diamond v. Diehr* (450 U.S. 175 (1981)) held that "an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection."

Further, under *Diehr*, the claim must be considered as a whole when determining whether it is directed to patentable subject matter with a useful and practical application. The claims under rejection are to a device that calculates a rotational speed of a wheel based on pulse signals. As in the *State Street Bank* case, where there was a calculation of a transient "final share price", the calculation of a speed in the present invention is a useful, tangible and concrete result.

Finally, *Diehr* instructs that considering the entire claim ensures that patents may be issued when abstract ideas are paired with useful practical applications in the other steps in the claimed process, *Diehr* at 187. The Supreme Court clearly recognized that the presence of an abstract idea in a claim containing structural limitations would be patentable subject matter. Applicants do not concede that the present invention even has any abstract idea, but to the extent that one is found, the claim clearly defines patentable subject matter within the broad spectrum

of inventions considered patentable in Section 101 of the original Patent Act of 1952. The Supreme Court in the *Diehr* and *Chakrabarty* decisions recognized that this section permits patenting by "anything under the sun made by man."

Claim Rejections – 35 U.S.C. § 112, ¶1

Claims 1-4 and 9 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. This rejection is traversed for at least the following reasons.

The Examiner states that "without an output, as explained above in 35 U.S.C. § 101 rejection, this system is not enabled. This rejection is not correct because the invention as a whole is a combination of structures, as recited in the claims. The structures are clearly disclosed in an enabling manner, with textural descriptions and detailed illustrations. The structure and function of each limitation is found in the original disclosure and is enabled, in accordance with the requirements of Section 112 of the Patent statute.

Applicants respectfully submit that the detailed disclosure is adequate to satisfy the enablement requirement, even if no output were disclosed. However, in fact, as illustrated in Fig. 2A, there is an output to the brake control unit. This clearly satisfies even the Examiner's standards.

Claim 1

In paragraph 13 of the Office Action, the Examiner asserts that the phrase "corresponding to" in paragraphs c. and f. prevents the system from being enabled. The Examiner asks how do the a/c detection signals correspond to eddy current change? The Examiner also asks how do the threshold levels correspond to the facing distance?

Applicants would assert that this terminology is used in the specification at paragraphs [0027], [0030]-[0033], [0037], [0038], [0042], [0048], [0050], [0073]-[0076], [0078], [0089]-[0095] and [0106] in connection with the subject matter of paragraphs c and f of the claim. Figs. 4A, 4B, 7A and 7B also are pertinent in disclosing relative forms and values of waveforms and voltage levels that may be used. As the Examiner must know, the specification is written to the

level of one skilled in the art, and these teachings more than adequately meet the standard for enablement.

The Examiner also asserts that the phrase "according to" in paragraph g. of claim 1 prevents enablement and asks how are pulses converted into signals according to the shifted threshold levels?

Applicants respectfully submit that this terminology is used in the specification at paragraphs [0027], [0030]-[0031], [0034], [0035], [0046], [0088], [0089], [0098] and elsewhere in the specification in connection with the threshold levels defined in paragraph g of the claim. Figs. 4A, 4B, 7A and 7B also are pertinent in disclosing relative forms and values of waveforms and voltage levels that may be used. Again, the specification is written to the level of one skilled in the art, and these teachings more than adequately meet the standard for enablement.

In paragraph 14 of the Office Action, the Examiner points to the phrase "preset threshold levels" in paragraph d. and asks for a description of the metes and bounds of this term, and questions whether the levels preset at the same values for all applications and configurations of wheels and speeds, in all environments and systems? The Examiner asserts that there are no details of how and in what manner the claimed preset is obtained.

Applicants respectfully submit that this terminology is used in the specification at paragraphs [0027], [0034] and elsewhere in the specification in connection with the threshold levels defined in paragraph g of the claim. Figs. 4A, 4B, 7A and 7B also are pertinent in disclosing relative forms and values of waveforms and voltage levels that may be used. Again, the specification is written to the level of one skilled in the art, and these teachings more than adequately meet the standard for enablement. Thus, the levels that are used may be preset at values that are appropriate for different applications and configurations of wheels and speeds, in different environments and systems, as may be determined by one skilled in the art based on empirical studies or expert selection. They may be set at the factory or in the field. The important fact is that they are preset levels. Additional detail is not required, as the specification is not intended to be a design document filled with such detail, as has been held in many court decisions. See MPEP 2165.05(a), MPEP 2164.08 and MPEP 2165.01.

Claim 3

With regard to claim 3, the Examiner asks in paragraph 13 how does the threshold shifter obtain a difference between a/c averages? Is there any user input? How do the threshold levels correspond to the difference in ac averages?

Applicants respectfully submit that this terminology is used in the specification at paragraphs [0038], [0040]-[0041], [0048], [0050], [0081], [0085]-[0090], [0095]-[0103] and elsewhere in the specification in connection with the differences between a default average and an average of ac detection signals, as defined in the claim. Again, the specification is written to the level of one skilled in the art, and these teachings more than adequately meet the standard for enablement. There may or may not be user input, since one skilled in the art would know that there may be manual or dynamic processor-based adjustments. Such features are not claimed and no disclosure of them is needed.

Claim Rejections – 35 U.S.C. § 112, ¶2

Claims 1-4 and 9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. This rejection is traversed for at least the following reasons.

The Examiner presents a general objection to the claims as being "replete with grammatical and idiomatic errors." Applicants have amended claim 1 in a manner that is believed to overcome the rejection.

The Examiner asserts that the term "hysteresis" is a "relative term which renders the claim indefinite." The Examiner asserts that the term is not defined in the claim and that the specification does not provide a standard for ascertaining the requisite degree. The Examiner points to a different definition from two sources in supporting his conclusion that the term is indefinite.

In reply, Applicants traverse this assertion and respectfully note that this term has a well known meaning in the relevant art, and is used in the specification consistent with that meaning (see, e.g., paragraph [0078]. Further, the term is expressly used in the references cited by the Examiner, and in a way that is consistent with the way it is used in the present application (see,

e.g., hysteresis circuit 80 in Tsugawa). There is no basis for confusion, contrary to the Examiner's assertions. Applicants respectfully submit that the rejection should be withdrawn.

Claim Rejections – 35 U.S.C. § 103

Claims 1, 2, 4 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Koss et al (6,147,486) in view of Tsugawa (4,894,613). This rejection is traversed for at least the following reasons.

The invention defined by claim 1is a wheel speed detection system. The system includes a rotator which rotates on an axle center of a wheel 3 together with the wheel, and plural concave and convex portions formed on a periphery of the rotator along a rotational direction with predetermined intervals therebetween. This is disclosed at paragraph [0071]-[0072] and is illustrated in Fig. 1, in the form of portions 7, 7a, 7b. The system also includes a sensor head 10 that is disposed so as to face a surface of the convex portion 7a with certain distance therebetween, and constituted with a coil 11 to generate alternate current magnetic field therearound under supply of alternate current.

A detector 10 which excites the coil by supplying alternate current to generate eddy current on the concave and convex portions, and outputs alternate current detection signals corresponding to a change in an amount of the eddy current generated with rotation of the rotator. A pulse converter 23, which converts the alternate current detection signals into pulse signals according to preset threshold levels is provided and couples to a speed calculator 24 that is used to calculate rotational speed of the wheel, based on the pulse signals, and output the signal to a brake control unit. Notably, the admitted prior art, as disclosed at pages 4-9 has a structure that is similar, including the use of electronic sensing of eddy currents, but encounters a problem that is solved by use of a variable threshold.

Thus, the claim also specifies that the wheel speed detection system further comprises a threshold shifter which shifts the threshold levels corresponding to actual facing distance between the surface of the convex portion and the sensor head. Thus, when the threshold levels are shifted by the threshold shifter, the pulse converter conducts conversion into the pulse signals according to the shifted threshold levels. Specifically, as taught at paragraph [0078] et seq. with respect to Fig. 1, the signal level determination unit 22 will calculate the thresholds and produce

a pulse at a level appropriate for comparison in pulse conversion unit 23 with the detected pulse signals from A/D converter 21. Here, preset (or default) voltages in unit 22 are shifted corresponding to detection data. Fig. 3 shows a flow chart for continuous adjustment during vehicle travel, based upon a difference between an actual average voltage and a default average that leads to a shifting amount Z, as explained beginning at paragraph [0081].

Koss

The Examiner asserts that Koss discloses a wheel speed detection system comprising:

a) a rotor [abstract; Fig. 1] SCH]],

b) a sensor head with a coil [Fig. 1] SE]; col. 1, lines 12-35],

c) a pulse converter and a speed calculator [col. 3, lines 40-59],

d) a threshold shifter [Abstract], and

The threshold levels may cause the pulses to convert to signals according to the shifted threshold levels [col. 3, lines 10-35]. The Examiner admits that Koss et al is silent regarding eddy current detection.

With reference to Fig. 1 of Koss et al, a sensor signal analyzing circuit is illustrated where the output voltage of the sensor SE that detects a rotating disk SCH angular position marks WM and intervening spaces ZR is used. The sensor SE produces an alternating voltage as the disk SCH rotates about shaft W, the signal having an alternating voltage U_E. The alternating voltage is converted into a rectangular voltage signal U_A. For analysis of the alternating voltage UE occurs in the circuit means BH that includes two comparators V_1 and V_2, which together with the circuit portion FK form a window comparator.

As explained at col. 3, lines 11-36, the alternating voltage is compared to an upper threshold value U_{OS} and a lower threshold value U_{US}. A down counting process and up counting process is implemented on the basis of a comparison of the input signal through the threshold values and the difference used to actuate a voltage adjustment by the threshold adjustment circuit portion SN. Both the lower and upper thresholds are increased or decreased, based upon the determination.

Two embodiments of the threshold adjustment circuit portion SN are illustrated in Figs. 2 and 3. Fig. 2 uses an n-bit up-down counter Z, while Fig. 3 replaces the counter with a switchable current source/current sync, as explained at col. 4, line 45. In both cases, the upper threshold is increased to the same extent as the lower threshold.

A significant difference between the structure disclosed and claimed in the present application and Koss et al involves the detailed combination of the signal level determination unit 22 and the pulse conversion unit 23. According to the present invention, signal level determination unit 22 produces an actual threshold voltage, which is input through the pulse conversion unit 23. This is explained at paragraph [0078] - [0083], with regard to Fig. 3. An actual average voltage is compared to a default average in order to identify a shifting amount. The actual threshold voltages are obtained by shifting the default threshold voltages by the shifting amount Z, as explained at paragraph [0082]. This value is compared to the output of the A/D converter 21, which is converted into pulse signals, and output to the speed calculation unit 24.

Applicants note that claim 1 recites a threshold shift which shifts the threshold levels corresponding to actual facing distance between the surface of the convex portion and the sensor head. Applicants have amended claim 1 to add the limitations of claim 3 (without including the limitations of claim 2). This feature clearly is not taught in Koss.

Tsugawa

Moreover, the Examiner admits at page 10 of the Office Action that Koss is silent regarding eddy current detection. The Examiner looks to Tsugawa for such teaching at col. 1, lines 35-40 and concludes that it would have been obvious to one of ordinary skill to combine the eddy current detector of the wheel speed detection system of Tsugawa with the pulse converter and threshold shifter of the wheel speed detection system of Koss et al. However, the combination of Tsugawa with Koss et al (or any other cited art) would not teach the subject matter of claim 1, as amended.

Applicants note that the Examiner has not rejected claim 3 on the basis of prior art. Thus, Applicants submit that with the present amendment to claim 1, all of claims 1, 2, 4 and 9 should now become patentable.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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